the limited surface of the river is insufficient to account for so great a dissipation, but we know that the spongy texture of the alluvial soil is remarkably pervious to the waters of the river: from the flat and humid surface of the Delta, a perpetual evaporation exists, the lateral pressure of the waters of the river must supply the waste by exhalation, and this immense expence of fresh water, is to be accounted for by filtration and evaporation.

No. XXXIII.

Demonstration of a Geometrical Theorem; by Joseph Clay Esq. of Philadelphia.

Read July 20th, 1804.

THE following proposition was mentioned to me, some years since, as one which had been proposed by Mr. Simpson some time before his death. I do not know that any demonstration has hitherto been published.

From the angles at the base of any triangle, let two right lines be drawn cutting each other in any point within the triangle, and cutting the sides of the triangle, the segments of the sides and of the lines so drawn will form a trapezium; draw and bisect the diagonals, the right line joining the points of bisection, will, if produced, bisect the base of the triangle.

In the triangle ABC, (Fig. 6, Plate V.) draw CD, BE, cutting each other in F, and the sides of the triangle E and D. Draw AF and DE, and bisect them in G and H; draw GH, which if produced, will bisect the base of the triangle in K, making BK equal to KC.

Through F, draw LFM, NFO, parallel to AB and AC cutting the sides in M and O and the base in L and N: now because of the similar triangles, as CF is to CD so is FL to BD and LM to AB. Therefore by alternation as FL is to LM so is BD to AB. But as FL is to LM so is FN to CM; Therefore as BD is to AB so is FN to CM and the rectangle under BD, CM is equal to the rectangle under AB, FN. Again, as BF is to BE so is BO to AB and so is FN to CE; therefore as BO is to AB, so is FN to CE; and the rectangle under BO, CE is equal to the rectangle under AB, FN But the rectangle under BD, CM is also equal to the rectangle under AB, FN, it is therefore equal to the rectangle under BO, CE. Therefore as BD is to CE, so is BO to CM. Through H draw HI, HP, parallel to AB and AC. Then because EH is equal to HD, and HI is parallel to BD, BE is bisected in I, and HI is one half of BD. In the same manner CD is bisected in P, and PH is one half of CE. Bisect BC in K and draw KP, and KI which produce to S and T. Then because CK is equal to KB, and CP is equal to PD, KP is parallel to BD and equal to one half of BD, and in the same manner KI is parallel to CE and equal to one half of CE; and K, P, H, I is a parallelogram. And CS is equal to AS, and BT to AT. Through G draw VG parallel to AC, and produce VG to X, cutting CD in X, KS in W, and HI produced in Z: draw XY parallel to AB. Then because AG is equal to GF and VG is parallel to AC, and consequently to OF, AV is equal to VO; But AT is equal to BT, therefore BO which is equal to the difference between twice AT and twice AV, is equal to twice TV. Because AG is equal to GF and GX is parallel to AC, FX is equal to CX, and because XY is parallel to AB and consequently to FM, CY is one half of CM; but CS is equal to SA. And AM which is equal to the difference between twice CS and twice CY is equal to twice SY. Because GA is equal to FG and GX is parallel to AC, GX is equal to one half of AC, it is therefore equal to CS. WX is parallel to SY, and SW to XY, therefore SWXY is a parallelogram and SY is equal to WX, GW is therefore equal to CY, and CM is equal to twice GW; and because KW is parallel to TV and VW to KT, KTVW is a parallelogram and KW is equal to TV, and BO is equal to twice KW. But as BD is to CE so is BO to CM, that is as twice KP is to twice PH so is twice KW to twice GW, so as KP is to PH so is KW to GW, and therefore as KP is to the difference between KW and KP, so is WZ which is equal to PH to the difference between GW and WZ, that is as KP is to HZ which is equal to PW so is PH to ZG. Join GH and HK; now the triangles GZH, HPK, have equal angles, GZH and HPK, because GZ is parallel to HP and ZH to KW, and the sides ZH, ZG, KP, PH which are about the equal angles proportional, therefore the remaining angles HGZ, GHZ of the triangle GZH are equal to the remaining angles PHK, PKH of the triangle HPK, each to each which are opposite to the homologous sides, so the angle HGZ is equal to the angle PHK and the angle GHZ is equal to the angle PKH. The angle ZHP is equal to the angle HPK, because ZH is parallel to PK and PH falls upon them; and the three angles GHZ, ZHP, and PHK taken together are equal to the three angles HKP, HPK, and PHK taken together, that is to two right angles. So to the point H in the right line ZH are drawn two right lines KH and GH on opposite sides, making the two angles KHZ and GHZ taken together equal to two right angles; therefore the two right lines form one straight line; But BC is bisected in K by construction, and the right line GHK drawn through G and H bisects BC. Therefore in the triangle ABC, CD and BE being drawn, cutting each other in F, and the sides of the triangle in D and E, and the diagonals AF DE of the trapezium ADFE being drawn and bisected in G and H, the right line GH joining the points of bisection being produced bisect the base. Q. E. D.

No. XXXIV.

An Account and description of a TEMPORARY RUDDER, *invented by Captain William Mugford, of Salem, (Massachusetts) and for which the Society awarded to him a Gold Medal, from the Extra-Magellanic fund.*

Motto. Nil desperandum—cras iterabimus æquor.

Read November 16th 1804.

THE Ship Ulysses of Salem (Massachusetts) under the command of Captain William Mugford, sailed from that port on the 2d day of January 1804, bound to Marseilles. On the